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THE UREDINEÆ OF ILLINOIS--A LIST OF THE SPECIES.

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The list of species herewith presented embraces all those now known to occur in Illinois. There are, according to the determinations made, species as follows: *Uromyces*, twenty; *Puccinia*, forty-eight; *Phragmidium*, five; *Ravenelia*, one; *Gymnosporangium*, one; *Cronartium*, one; *Melampsora*, four; *Coleosporium*, two; *Uredo*, one (isolated); *Cæoma*, two (isolated); *Æcidium*, forty-one (isolated); *Ræstelia*, two (isolated).

This is a total of one hundred and twenty-eight species, including the isolated forms described, of *Uredo*, *Cæoma*, *Æcidium* and *Ræstelia*. There are known in the *Uromycetes* the three fruit forms, or the complete number of alternate stages, of four species, the second and third forms for eleven species, the first and third forms for one species and the third form alone for four species. For the *Puccinia* there are the three forms of six, the second and third of twenty-five, the first and third of two and the third alone of fourteen species.

In the case of *Phragmidium* we have the three forms of one species, the second and third of three, and the third alone of one species.

The four species of *Melampsora* have each the second and third forms and the two species of *Coleosporium* have also for each the second and third forms.

The *Ræstelia* form for the single species of *Gymnosporangium* has not been positively identified, but there is considerable evidence that the *Ræstelia* on orchard apple-trees is an alternate form of *Gymnosporangium macropus* on *Juniperus Virginiana*. Wherever the latter occurs the apple-trees in the vicinity are uniformly infested with *Ræstelia*, and this last is never found in wide districts where the red cedar does not grow. The native crab-apple is

affected in every way similar to the cultivated apple. The *Ræstelia* on the former has been identified as *R. penicillata* (Sow.) Fr., by Professor Farlow, and that upon the orchard apple is certainly very similar, if not identical, yet the specimens studied seemed to be *R. lacerata* (Sow.) Fr., if indeed these two species can be morphologically separated. Possibly some other species of *Gymnosporangium* does occur in Illinois on *Juniperus*, and thus two *Ræstelia* can be accounted for, but careful search instituted for the purpose has revealed only *Gymnosporangium macropus*. This latter is common and the galls are familiarly known as cedar-balls.

It should be said, the only proof we have, so far as personal studies are concerned, of the genetic connection of any of the supposed alternate forms, is their occurrence together and their peculiarities of growth—no cultural studies having been made. In cases where the connection of forms has been demonstrated by others, there has been no hesitancy in accepting the conclusions, but mere guesses have not been followed without the accompanying evidence from observation. Whatever mistakes may have been made have some reasonable groundwork of excuse. There is left, however, an unsatisfactorily large list of isolated, incomplete forms: *Uredo*, one; *Cæoma*, two; *Æcidium*, forty-one, and *Ræstelia*, two. One of the latter may be *Gymnosporangium macropus*, as already indicated and more surprising things occur than that both the *Ræstelia* enumerated belong to this one species.

Besides the *Æcidia* given in the list, there are several forms on various Compositæ which have not been specifically identified. We have described seven of these forms under *Æ. compositarum*, without, however, attempting to assign them to named species.

The distinction adopted between the so-called genera *Uredo* and *Cæoma* may or may not receive the sanction of critics; there is certainly nothing positive in usage, neither do the original generic descriptions aid one in separating the genera. The uredo-forms having the spores on pedicles are here classed under *Uredo*, those in which the spores are produced in vertical chains are assigned to *Cæoma*. The former appear never to be accompanied by spermatogonia, the latter usually are, so that besides the method of spore production a relation is indicated to *Æcidium*. It is, therefore,

possible that what we class as *Cæoma* belong to the first rather than to the second fruit form of the real species.

Among the *Cæomæ*, that commonly known as "orange rust" on blackberry and raspberry leaves is one of the most remarkable. It is more commonly known to botanists as *Uredo luminatum*, Schw., but whatever may be said of the generic term, the specific name *nitens* certainly has precedence. The spores are produced in vertical chains and spermagonia are present. We have, therefore, written *Cæoma nitens*, Schw. Aside from its destructive effects on important cultivated plants, it is so conspicuous from the abundant bright-colored spores, completely covering the lower surface of infested leaves, that it draws the attention of the most casual observer. Among agriculturists and horticulturists, no leaf fungus, except, perhaps, wheat rust, is so generally recognized and identified as something abnormal to the host-plant. Certainly no leaf-parasite is better known by American mycologists. Yet we are in ignorance of its life-history, the final or perfect fruit-form is only guessed at. It is certain such an alternate spore-form does exist as an essential annual stage in the growth of the fungus, but here the certainty ends. Botanists have surmised it is the uredo-form of some *Phragmidium*. I venture to suggest, instead of the latter, *Puccinia Peckiana*, Howe, but the proof for a confident statement is not yet complete.

The group of species herein recognized as the genus *Melampsora* has not been distributed among the so-called allied genera. The distinctions do not seem to be necessarily generic ones, and the difficulty of making out the microscopical characteristics upon which these distinctions depend, at least, in dried specimens, practically precludes the generic separation.

The proposed genera, *Pileolaria*, *Uropyxis* and *Dicæoma*, have not been accepted; the first is included with *Uromyces* and the two latter with *Puccinia*.

There are numerous questions of identification and nomenclature which cannot be entered upon here. The effort has been made to reduce rather than multiply species, but much care has been taken in a conservative kind of way to ascertain what are entitled to specific distinction without much reference to the names

commonly employed. In every case the name having priority has been chosen, however this may conflict with more common usage. But in the question of priority, the æcidial name has not been considered. There is far too much uncertainty, in the absence of recognizable type specimens, of the intended application of the older æcidial names, and, especially, there is much too little real knowledge of genetic relationships to permit the adoption of æcidial names for teleutoform species.

The uredo, however, is more easily recognizable from published descriptions, and this form is found on the same host plant, often characteristically associated, in place and time, with the teleutoform. The objections to the adoption of the æcidial names do not equally apply to those of the uredo. In the present list the oldest, the earliest, name known for the uredo or teleutoform is the one chosen:

LIST OF SPECIES.

UROMYCES, LINK.

- U. hyperici* (Schw.), Curt..... *Hypericum pulitum*.
Elodea Virginica.
U. terebinthi (DC.), Wint..... *Rhus toxicodendron*.
U. hedyari-paniculati (Schw.), Farlow.. *Desmodium paniculatum*.
D. cuspidatum.
D. Canadense.
D. rotundifolium.
U. lespedezae (Schw.), Peck..... *Lespedeza procumbens*.
L. repens.
L. violacea.
L. hirta.
L. capitata.
U. fabae (Pers.), DBy..... *Lathyrus palustris*.
L. venosus.
L. ochroleucus.
U. appendiculata (Pers.), Lev..... *Phaseolus vulgaris*.
P. diversifolius.
P. helvolus.
U. cenotheae, Burrill..... *Oenothera linifolia*.
U. spermacoces (Schw.), Curt *Diodia teres*.
U. rudbeckiae, Arth. and Hol... .. *Rudbeckia laciniata*.
U. Howeii, Peck..... *Asclepias Cornuti*.
U. polygoni (Pers), Fkl..... *Polygonum aviculare*, var. *erectum*.
P. ramosissimum.
U. euphorbiae, C. & P..... *Euphorbia maculata*.
E. hypericifolia.
E. dentata.
E. heterophylla.
U. caladii (Schw.), Farlow..... *Arisaema triphyllum*.
A. dracontium.
Peltandra Virginica.
U. pyriformis, Cke..... *Acorus calamus*.
U. sparganii, C. & P..... *Sparganium eurycarpum*.
U. erythronii (DC.), *Allium striatum*.
U. junci (Schw.), Tul..... *Juncus tenuis*.
U. scirpi, Burrill..... *Scirpus fluviatilis*.
U. acuminata, Arthur..... *Spartina cynosuroides*.

- U. graminicola, Burrill.....Panicum virgatum.
Elymus Virginicus.

PUCCINIA PERS.

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| P. anemones-Virginianæ, Schw..... | Anemone cylindrica.
A. Virginiana. |
| P. ranunculi, Seymour..... | Ranunculus repens. |
| P. podophylli, Schw..... | Podophyllum peltatum. |
| P. violæ, DC..... | Viola cucullata.
V. striata.
V. pubescens. |
| P. Mariæ-Wilsoni, Clin..... | Clatonia Virginica. |
| P. heterospora, B. & C..... | Sida spinosa. |
| P. nolitangeris, Cda..... | Impatiens fulva.
I. pallida. |
| P. amorphæ, Curt..... | Amorpha fruticosa.
A. canescens. |
| P. pruni-spinosæ, Pers..... | Prunus Americana.
P. Virginica.
P. serotina. |
| P. Peckiana, Howe..... | Rubus villosus. |
| P. tiarellæ, B. & C..... | Mitella diphylla. |
| P. proserpinacæ, Farlow..... | Proserpinaca palustris. |
| P. circææ, Pers..... | Circæa Lutetiana.
C. alpina. |
| P. pimpinellæ (Strauss), Lk..... | Osmorhiza longistylis.
O. brevistylis. |
| P. galiorum, Lk..... | Galium concinnum.
G. triflorum. |
| P. tenuis, Burrill..... | Eupatorium ageratoides. |
| P. kuhniæ, Schw..... | Kuhnia eupatorioides. |
| P. conoclinii, Seymour..... | Conoclinium cœlestinum. |
| P. asteris, Duby..... | Aster Shortii.
A. sagittifolius.
A. miser.
A. Novæ-Angliæ, etc. |
| P. silphii, Schw..... | Silphium terebinthinaceum.
S. integrifolium.
S. perfoliatum. |
| P. xanthii, Schw..... | Ambrosia trifida.
Xanthium strumarium. |
| P. tanacetii, DC..... | Helianthus annuus.
H. rigidus.
H. mollis.
H. decapetalus, etc. |
| P. tanacetii, DC., var. vernoniæ, Burrill..... | Vernonia fasciculata. |
| P. flosculosorum (Alb. & Schw.), Roehl..... | Cirsium discolor.
C. lanceolatum.
Taraxacum dens-leonis.
Hieracium Canadense. |

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| P. maculosa, Schw. | Cynthia Virginica. |
| P. lobeliæ, Gerard | Lobelia syphilitica.
L. perberula. |
| P. seymeriæ, Burrill. | Seymeria macrophylla. |
| P. lateripes, B. & R. | Ruellia ciliosa.
R. strepens. |
| P. menthæ, Pers. | Mentha Canadensis, etc.
Cunila Mariana.
Pycnanthemum pilosum.
P. lanceolatum.
P. linifolium.
Monarda fistulosa.
M. Bradburiana.
M. punctata.
Blephilia hirsuta. |
| P. glechomatis, DC. | Lophanthus nepetoides. |
| P. plumbaria, Peck. | Phlox divaricata. |
| P. convolvuli, Cast. | Calystegia sepium. |
| P. gentianæ (Strauss), Lk. | Gentiana puberula. |
| P. polygoni-amphibii, Pers. | Polygonum amphibium.
P. Virginianum.
P. acre (Uredo only).
P. Pennsylvanicum (Uredo only). |
| P. aletridis, B. & C. | Aletris farinosa. |
| P. smilacis, Schw. | Smilax hispida. |
| P. caricis (Schum.), Rebert. | Carex (species).
Dulichium spathaceum. |
| P. obtecta, Peck. | Scirpus validus. |
| P. angustata, Peck. | Scirpus atrovirens. |
| P. windsoriæ, Schw. | Muhlenbergia (species). |
| P. graminis, Pers. | Triticum vulgare.
Avena sativa.
Agrostis vulgaris.
Hordeum jubatum. |
| P. phragmitis (Schum.), Krnck. | Spartina cynosuroides.
Phragmites communis.
Andropogon furcatus.
A. scoparius. |
| P. rubigo-vera (DC.), Wint. | Triticum vulgare.
Avena sativa.
Secale cereale.
Elymus Virginicus. |
| P. coronata, Corda. | Avena sativa.
Triticum vulgare. |
| P. emaculata, Schw. | Tricuspis seslerioides.
Eragrostis pectinacea.
Panicum capillare.
P. virgatum. |
| P. flaccida, B. & Br. | Panicum crus-galli. |
| P. andropogi, Schw. | Andropogon furcatus.
A. scoparius. |
| P. maydis, Carradori. | Zea Mays. |

ÆCIDIUM, PERS.

Æ. ranunculacearum, DC.	Anemone Pennsylvanica.
Æ. ranunculi, Schw.	Ranunculus abortivus.
Æ. punctatum, Pers.	Hepatica triloba. Anemone nemorosa.
Æ. actææ (Opiz.), Wallr.	Actæa spicata.
Æ. dicentræ, Trelease.	Dicentra cucullaria.
Æ. Mariæ-Wilsoni, Peck.	Viola cucullata.
Æ. hibisciatum, Schw.	Hibiscus militaris.
Æ. geranii, DC.	Geranium maculatum.
Æ. impatientis, Schw.	Impatiens.
Æ. pteleæ B. & C.	Ptelea trifoliata.
Æ. onobrichidis, Burrill.	Psoralea Onobrychis.
Æ. psoraleæ, Peck.	P. floribunda.
Æ. leucostictum, B. & C.	Lespedeza procumbens.
Æ. orobi, Pers.	Amphicarpæa monoica.
Æ. grossulariæ, DC.	Ribes rotundifolium. Cultivated gooseberry.
Æ. epilobii, DC.	Ænothera biennis.
Æ. ænotheræ, Peck.	Ænothera biennis.
Æ. sambuci, Schw.	Sambucus Canadensis.
Æ. diodiæ, Burrill.	Diodia teres.
Æ. cephalanthi, Seymour.	Cephalanthus occidentalis
Æ. houstoniatum, Schw.	Houstonia cœrulea.
Æ. erigeronatum, Schw.	Erigeron Canadense. E. bellidifolium. E. Philadelphicum. E. annuum.
Æ. asterum, Schw.	Aster sagittifolius, etc. Solidago latifolia. S. cæsia. S. rigida. S. altissima, etc.
Æ. compositarum.	Compositæ.
Æ. plantaginis, Ces.	Plantago Virginica.
Æ. lysimachiæ (Schl.), Wallr.	Lysimachia ciliata.
Æ. pentsemonis, Schw.	Pentsemon pubescens.
Æ. lycopi, Gerard.	Lycopus Europæus.
Æ. myosotidis, Burrill.	Myosotis verna.
Æ. hydrophylli, Peck.	Hydrophyllum appendiculatum.
Æ. polymonii, Peck.	Polymonium reptans. Phlox pilosa.
Æ. solani, Mont.	Physalis viscosa.
Æ. apocyni, Schw.	Apocynum cannabinum.
Æ. Jamesianum, Peck.	Asclepias Cornuti.
Æ. fraxini, Schw.	Fraxinus viridis.

<i>Æ. pustulatum</i> , Curtis.....	<i>Comandra umbellata</i> .
<i>Æ. euphorbiæ</i> , Gmel.....	<i>Euphorbia polygonifolia</i> .
	<i>E. hypericifolia</i> .
	<i>E. maculata</i> .
	<i>E. dentata</i> .
<i>Æ. crotonopsidis</i> , Burrill.....	<i>Crotonopsis linearis</i> .
<i>Æ. urticæ</i> , Schum.....	<i>Urtica</i> .
<i>Æ. smilacis</i> , Schw.....	<i>Smilax herbacea</i> .
<i>Æ. trillii</i> , Burrill..	<i>Trillium recurvatum</i> .
<i>Æ. convallariæ</i> , Schum....	<i>Smilacina racemosa</i> .
	<i>S. stellata</i> .

RÆSTELIA, REBENT.

<i>R. lacerata</i> (Sow.), Fr.....	<i>Cratægus tomentosa</i> .
	<i>C. coccinea</i> .
<i>R. penicillata</i> (Sow.), Fr.....	<i>Pyrus coronaria</i> .